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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/270,768 | 03/17/1999 | ALASTAIR SIBBALD | 3017/47588 | 2922 |

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CREATIVE LABS, INC.
LEGAL DEPARTMENT
1901 MCCARTHY BLVD
MILPITAS, CA 95035

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| EXAMINER |
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GRAHAM, ANDREW R

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| ART UNIT | PAPER NUMBER |
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2644

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/270,768

Applicant(s)

SIBBALD ET AL.

Examiner

Andrew Graham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 13-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-10 and 13-15 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 November 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Response to Arguments

1. Applicant's arguments, filed November 1, 2004, with respect to claims 1-10 and 13-15 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

2. The drawings were received on November 1, 2004. These drawings are approved and have been entered into the application. Accordingly, the previous objections to the drawings are hereby withdrawn.

Claim Objections

3. The amendments involving the format of Claims 1 and 13-14 are acknowledged and are sufficient to overcome the previous grounds of objection under 37 CFR 1.75(i). Accordingly, said objections have been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United

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States and was published under Article 21(2) of such treaty in the English language.

4. **Claims 1, 4, 5, 7-10, and 13-15** are rejected under 35 U.S.C. 102(e) as being anticipated by Gardner (USPN 6243476 B1).

Gardner teaches a system for addressing high frequency crosstalk in a virtual sound source reproduction system.

Specifically regarding **Claim 1**, Gardner teaches:

A method (function performed by system) of processing a single channel audio signal (input of single sound source x ; col. 4, lines 5-19; col. 5, lines 56-63; col. 10, lines 22-26) to provide an audio signal (output of 115_L, 115_R) having left and right channels (Y_L, Y_R) (col. 10, lines 29-30; col. 11, lines 10-12) corresponding to a virtual sound source (sounds, such as s_1) at a given direction ("spatial location") in space relative to a preferred position of a listener in use (spatial locations appear to listener LIS, col. 10, lines 48-52),

the space including a forward hemisphere and a rearward hemisphere relative to said preferred position (three dimensional audio, col. 18, lines 1-4; azimuths from 0 to 180° considered; Figures 4, 9; col. 13, lines 21-25),

the information in the channels including cues for perception of the direction of said single channel audio signal from said preferred position (by virtue of binaural synthesis, col. 4, lines 19-26),

the method including the steps of:

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i) providing a two channel signal (splitting or dual path application of input x , Figure 14) having the same single channel signal (x) in the two channels (col. 14, lines 47-50);

ii) providing HRTF filtering ($300_L, 300_R$) by modifying the two channel signal (two path inputs of x) by modifying both of the channels using one of a plurality of head response transfer functions (filter values stored in table and interpolation unit 130, selected based on relative orientations, col. 5, lines 20-24; col. 12, lines 43-67) to provide a right signal (X_R) in one channel for the right ear of a listener (output through 350_R) and a left signal (X_L) in the other channel for the left ear of the listener (output through 350_L) (col. 14, lines 47-65; Figure 14);

iii) introducing a time delay (by 205, 210, 215) between the channels corresponding to the inter-aural time difference (ITD) for a signal coming from said given direction (col. 13, lines 3-25)

characterized in that the method further includes augmenting the HRTF filtering ($300_L, 300_R$) of the signal in both channels using high frequency (HF) cut filter means (shelving filters, $400_L, 400_R$) (col. 17, lines 28-36),

the filter characteristics of the HF-cut filter means ($400_L, 400_R$) being settable according to the given direction of the virtual sound source (gains are established at least in part on source locations, col. 17, lines 21-28).

Regarding **Claim 4**, Gardner teaches:

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the left and right channel signals (outputs of $400_L, 400_R$, Figure 15) are processed by transaural crosstalk cancellation means in order to give loudspeaker compatible signals (col. 17, lines 64-67).

Regarding **Claim 5**, Gardner teaches:

the coefficients (g_L, g_R) of the HF-cut filter means ($400_L, 400_R$) are set according to a function of the angle of azimuth and the angle of elevation of the virtual sound source (inherent, 3-dimensional sound set according to source locations and listening geometry; col. 17, li21-28; col. 18, lines 1-4).

Regarding **Claim 6**, Gardner teaches:

the amount of HF-cut filtering (gain of $400_L, 400_R$) is substantially the same for virtual sound sources placed at positions on the rear hemisphere which are equidistant from azimuth $\pm 180^\circ$ and elevation 0° relative to the preferred position of the listener (inherent, gains derived from HTRFs, for virtual sources outside physical speaker locations, total power transfer into two ears equals total power transfer in the HRTFs, KEMAR head shadowing is symmetrical; col. 15, lines 42-60; col. 16, lines 3-49)

Regarding **Claim 7**, Gardner teaches:

the coefficients of the HF-cut filter means ($400_L, 400_R$) are set via a look-up table (database format, col. 17, lines 24-28).

Regarding **Claim 8**, Gardner teaches:

the HF-cut filter means ($400_L, 400_R$) is used in series with an HRTF (Figure 15).

Regarding **Claim 9**, Gardner teaches:

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an HRTF is convolved with an HF-cut filter means to produce a modified HRTF (equation 31, col. 16, lines 5-15).

Regarding **Claim 10**, please refer to the above rejection of the method recited in Claim 1, noting that Gardner teaches:

including signal processing means (DSP equipment) (col. 5, lines 30-55), HRTF filter means (300L, 300R), HF-cut filter means (400L, 400R) and a means (database, such as part of 130) for determining HF-cut filter coefficients as a function of the direction of the virtual sound source (col. 17, lines 21-42).

Regarding **Claim 13**, please see the above rejection of the similar limitations of Claim 1, noting that the system may be implemented as software running on a general purpose computer (col. 5, lines 33-39).

Regarding **Claim 14**, please refer to the above rejection of similar limitations of Claim 1, noting that the system of Gardner produces an audio signal, such as a sound s_1 (col. 10, lines 48-52).

Regarding **Claim 15**, please refer to the above rejection of similar limitations of Claims 1 and 10.

Allowable Subject Matter

5. **Claims 2 and 3** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Atal et al (USPN 3236949) is disclosed by the applicant as related prior art.

Cooper et al (USPN 4975954) is disclosed by the applicant as related prior art.

Norris et al (USPN 6173061 B1) teaches a system for compensating for front and back cueing in head related transfer functions involved in virtual sound source positioning systems.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Graham whose telephone number is 571-272-7517. The examiner can normally be reached on Monday-Friday, 8:30 AM to 5:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached at 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



SINH TRAN
SUPERVISORY PATENT EXAMINER



Andrew Graham

Examiner
A.U. 2644

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May 2, 2005